COMMAND HISTORICAL REPORT
1989
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Compiled and Edited by:

Susan D. Monty
Publications Editor

Released by:

R. G. Walter

R. G. Walter, CAPT, DC, USN
Commanding Officer

Naval Submarine Medical Research Laboratory
Naval Submarine Base New London
Groton, CT 06349-5900

COMMAND HISTORY
1989

1. Basic Historical Narrative

a. Command's Mission

The mission of this laboratory is to conduct research development, test, and evaluation in submarine, shipboard, and diving medicine to enhance the health, safety, and readiness of Navy and Marine Crops personnel in the performance of peacetime and contingency missions, and to perform such other functions or tasks as directed.

b. Command Staff

Commanding Officer: CAPT C. A. Harvey 1 Jan 89 - 8 Sep 89
CAPT R. G. Walter 8 Sep 89 - 12 Dec 89

Executive Officer: LCDR J. B. Bowman

Chief Scientist: CDR P. K. Weathersby

Biomedical Sciences Department
Director: A. B. Callahan, Ph.D.

Behavioral Sciences Department
Director: S. M. Luria, Ph.D.

Submarine Systems Department
Director: J. V. Tobias, Ph.D.

Technical Systems Department
Director: D. Wray

Research Support Department
Director: LT N. L. Duffy

Immediate superior in Command
James N. Woody, Commanding Officer
Naval Medical Research and Development Command
Bethesda, MD

c. Mission Accomplishment by Research Work Unit

61152N MR04101.001 Event related potentials reflect different stages in learning to discriminate complex auditory stimuli

Progress: Two methods of locating the source of electrical activity in the brain while discriminating sounds were studied. The "Imaging Technique" was found to discriminate multiple neural generators that are missed by the "Bipole Lateralization Method." This indicates the possibility of identifying brain sites active during phases of training to identify and classify complex auditory signals. This may yield an indicator of the information processing resources required for such discriminations.

Research Reports:

Draft MS. Sidman, Ford, Ramsey, and Schlichting. Age-related features of the resting and P300 auditory evoked responses using the dipole localization method and cortical imaging technique. Submitted to J. Neuroscience Methods. (Enclosure 1)

61153N MR04101 001 5014 Cell culture modeling of neurophysiological pathology and brain associative processes

Progress. Installation of a tissue culture neurophysiology laboratory was completed. Media maximization studies on N2A cells were completed and reported in an NSMRL report, and two additional cell lines (NG-108 neuroblastoma/glioma hybrid and PC-12 rat adrenal pheochromacytoma) were obtained and stabilized. Techniques which produce predictable directional growth in neurite processes were refined and systematic investigation of cultured neural networks was initiated. Intracellular stimulation and recording studies, cellular morphology studies, neural potentiation studies, and ultrastructural electron microscopy studies were also initiated. One research report was published.

Research Reports:

1140. Rossi, Messier, and Heyder. Morphological features accompanying neural differentiation of neuroblastoma (N-2A) induced by reduced medial serum availability. (Enclosure 2)

61152N MR0000.01-5107 Role of calcium ion in development of therapeutic approaches to oxidative stress in Navy divers: using a cell culture system

Research Reports:

Draft MS. Messier & Fisher. Sensitivity of cultured cells to oxidative stress: I. Adaption to repeated exposures of hyperbaric oxygen (HBO). Accepted for publication by UBR. (Enclosure 3)

62233N MM33C30.002 5004 A computer based medical diagnostic/patient management system for use aboard submarines

Progress. A Completion was submitted 30 Sep 89. Six reports were published.

Research Reports:

1136. Fishekeller & Beaudry. Accuracy of a computer based program for "classic" presentation of dental pain. (Enclosure 4)

1141. Fisherkeller & Beaudry. Evaluation of a computer-assisted dental-diagnostic system by Navy hospital corpsmen. (Enclosure 5)

1143. Fisherkeller, Burgess-Russotti, Ralls, and Hamilton. A computer assisted program for the management of acute dental pain - USER'S MANUAL. (Enclosure 6)

1144. Caras, Southerland, & Fisherkeller. MEDIC - CHEST PAIN - A decision support program for the management of acute chest pain - USER'S MANUAL. (Enclosure 7)

1146. Caras, Southerland, & Fisherkeller. MEDIC - ABDOMINAL PAIN - A decision support program for the management of acute abdominal pain - USER'S MANUAL. (Enclosure 8)

M89-1. Fisherkeller, Burgess-Russotti, & Hamilton. Documentation for the computer based diagnostic program for dental injuries. (Enclosure 9)

61153N RR4209 001 ONR 4424207 Auditory classification based on the identifiability of complex stimulus features

Progress. Since the last summary, a fourth experiment has been completed examining the effects of stimulus context on the identification of amplitude modulation frequency. The results indicate the importance of a pitch cue for identification of modulation rates from 134-254 Hz. Two experiments have been

completed to assess the importance of amplitude modulation cues for classification of sonar signals. The results indicate that amplitude modulation is useful for aural classification of sonar signals.

Research Reports:

1128. Hanna. Modulation rate perception: identification and discrimination of modulation rate using a noise carrier. (Enclosure 10)

1142. Hanna. Preliminary report on classification of transient sonar signals. (Enclosure 11)

63173N M0099.01A 5012 Medical problems associated with pressurized submarine rescue

Progress. (A) The Pressurized Submarine Rescue Handbook was completed and submitted to higher authority for review and comment. (B) Ten man-dives, 28 FSWG for 6 hours; and 32 FSWG for 6 hours were completed without problem. One report was published.

Several milestones have slipped a minimum of three quarters due to the hiatus in saturation diving operations as a result of not having the requisite number of saturation trained personnel filling the watch stations of Diving Officer, Diving Supervisor, and Chamber Operator. As of the end of the third quarter, two saturation-qualified (NEC-5311) divers have reported aboard and have completed all requirements for standing watches for NSMRL dives. An intensive training and qualification program was instituted for non-diver Laboratory personnel so they can be utilized as chamber watchstanders in support of the above named positions. Saturation, hyperbaric chamber operations have resumed.

Research Reports:

1127. Parker. Upward excursion limits from air saturation at 5 ATA. (Enclosure 12)

Annual Report Addendum. Weathersby. (Enclosure 13)

63706N M0095 005 5010 Sea trials for computer-based medical diagnostic/patient management systems for use aborad SSN/SSBN submarines

Progress. New, user friendly versions of the Abdominal Pain program (including a female database) and the Chest Pain program, together with newly prepared user's and programmer's manuals were delivered to the Program Manager. Both programs included updated treatment protocols. A Dental Pain diagnostic

program was completed and delivered to the program manager with documentation. All three programs were subjected to preliminary clinical trials which confirmed their effectiveness. Two reports were published.

Research Reports:

1147. Southerland and Fisherkeller. CPDX - A decision support system for the management of acute chest pain - Version 3.0 - PROGRAMMER'S MANUAL. (Enclosure 14)

1148. Southerland & Fisherkeller. ABDX - A decision support system for the management of acute abdominal pain - Version 3.0 - PROGRAMMER'S MANUAL. (Enclosure 15)

63706N M0096.002-5015 Digital sonar processing for auditory sonar

Progress. After digitizing the sonar signals, the files were looped to form a continuous signal source. These recordings were then altered to the proper format necessary for the experiment. We were also successful in altering the playback rate of the digitized signal as proposed for research in FY92 and 93. Stimulus test tapes necessary for the first experiment were generated from the various digital sample-rate target recordings. Each 20 minute sample has been coded for rapid access during testing. Sample rates of 12.5, 6.25, and 3.12 kHz have been paired with amplitude coding of 12, 8, and 4 bits for each test target. New background recordings were created, and digitized versions of these were also generated at the same 9 combinations of sample rate and bit coding. Test instrumentation is complete. Data collection is complete. All milestones are on schedule. This work unit was terminated and transitioned to 65856N-M0100.001.

Research Reports:

Annual Report. Russotti. Development of techniques for synthesis and analysis of auditory stimuli used in sonar signal processing. (Enclosure 16)

63713N M0099 01C 5050 Development of a general hearing-conservation standard for diving operations

Progress. This is a new work unit. A DTIC search has been identified no currently funded research activity relevant to this work unit.

65856N M0100 001 Digital signal processing for auditory sonar

Progress. This is a new work unit. A DTIC search has been performed and has identified no other currently funded research activity relevant to this work unit.

65856N M0100 001 5001 Auditory sonar

Progress: Published reports have demonstrated techniques to enhance aural performance and have indicated how application of these methods can improve detection. Deeper exploration of some of the methods is clearly indicated; milestones have been modified accordingly. New research shows that the effects of changes in the hearing ability of auditory-sonar operators are focused on just a few people, that an experimental differential filtering technique and an experimental shaping technique each provide a small but significant improvement in target detection and may provide a larger improvement in classification, and that simultaneous use of both visual and auditory displays is more likely to lead to early detection of a number of types of targets than is the use of a display intended for one sensory mode alone. Five Reports were published.

All milestones on schedule except one on effects of listening time on performance. This was delayed by one quarter: a safety hazard was found and corrected.

Research Reports:

1126. Hanna & Russotti. Improved aural detection of sonar signals through differential filtering (S). (Enclosure 17; Sent under separate cover)

1130. Hanna & Marshall. Improved aural detection of sonar signals through shaping (S). (Enclosure 18; Sent under separate cover)

1132. Doll & Hanna. Effects of bimodal displays on sonar target detection. (Enclosure 19)

1138. Marshall & Hanna. Evaluation of two temporarily based signal-processing techniques for auditory sonar (S). (Enclosure 20; Sent under separate cover)

1139. Russotti & Wojtowicz. Effects of degree of noise correlation on passive sonar target detection using experimental auditory displays (S). (Enclosure 21; Sent under separate cover)

Annual Report - Summary of Accomplishments (S) (Enclosure 22; Sent under separate cover)

Annual Report - Summary of Accomplishments (U) (Enclosure 23)

65856N M0100 001 5003 Enhanced performance with visual sonar displays

Progress: Ideal detection was modeled by producing receiver operating characteristics (ROC) curves for 1, 2, and 3 bit quantization of passive broadband displays of 16, 32, 64, and 128 lines of data. Then, for comparison, we obtained ROC curves from sonar operators for the same conditions. Operator performance is significantly worse than ideal. But by color coding information presented at a bearing, it was demonstrated that the operator's ability to detect a target at that bearing can be increased by 2 dB. It was determined that color coding the existing NTDS symbol set leads to faster information processing; however, introducing color decreases the operator's ability to distinguish those attributes of the display that traditionally encode threat and platform. The newly developed procedure for calibrating colors on a CRT permits evaluation of the effectiveness of color sets for CRT displays on submarines. It was determined that there was a confusability of color names for a wide range of colors and we evaluated what influenced confusability color name has on the operator's ability to perform perception and cognitive tasks. Two reports were published. All amended milestones are on schedule.

Research Reports:

1131. Laxar, Moeller, & Rogers. The use of nonmetric multidimensional scaling in organizing a sonar data base retrieval system. (Enclosure 24)

1145. Divita, Neri, and Shim. An investigation of the integrality of color-coded NTDS symbols. (Enclosure 25)

1GAV600(90)5-88001 Psychophysical procedures for auditory measures with naive subjects

Progress. A model has been developed and evaluated with computer simulations for measuring threshold variability during adaptive threshold tracking. A protocol has been developed to test the model with listeners. A study has begun to test the application of the threshold-variability measurement with stimuli varying in difficulty. A protocol has been developed to compare the test-retested variability of an adaptive two-interval forced-choice and a clinical procedure using 2- and 5-dB step sizes.

Research Reports:

Paper presented at the fall ASA meeting. Leek, Hanna, & Marshall. Extracting stable measures from unstable psychometric performance. (Enclosure 26)

Coast Guard Contract. Evaluation of navigation range lights

Progress. Several proposed novel navigation beacons were tested and their relative sensitivities compared. Several reports will be written, and the results are scheduled to be presented at the DOD Biennial Psychology Conference at the Air Force Academy, April 1990.

Reports:

1149. Laxar and Mandler. Navigation performance using parallax range lights. (Enclosure 27)

2. Special Topics

a. Statistics on major functions. NA

b. Number of military and civilian personnel on board

As of Dec 1989:	Military Officers	11/14
	Military Enlisted	15/17
	Civilian Professional	25/31
	Civilian Supporting	12/14
	Wage Grade	1/3

c. Major command problems

1. Command Issues: The issues of interest usually revolve around the availability of research funds and human resources. This calender year was no different except for the fact that over 90% of the expected research funds were received at the beginning of the fiscal year. Thus, the beginning of FY90 started off with great expectations from a fiscal point of view. However, the Department of Defense hiring freeze has impacted negatively. As a result, it has been difficult to hire individuals who can assist in the accomplishment of the research misison.

2. Research Work Units:

Sea Trials: Limitations of personnel and funding have caused slippage of some milestones.

Digital Sonar: Excessive humidity in the sound suite for 7 months of each year has been an issue for several years. To date, the Submarine Base Public Works Department has not solved this problem. In addition, the ventilation system, designed without acoustically treated ducts, has an air exchange rate of once in 24 ours to minimize air flow noise. As a result, air conditioning becomes critical since ventilation alone will not provide safe temperatures for operation of precision scientific equipment. Given the amount of precision equipment and the critical nature of our measurements on system design, immediate steps are necessary to resolve this problem.

Repairs to the structure to remove entrapped ground water are an immediate necessity to protect equipment from moisture damage. An updated acoustically treated ventilation duct system with normal air exchange rates and with humidity and temperature control is essential to alleviating extensive equipment damage and down time.

full-time computer programmer is needed for psychoacoustic research. As in "Digital sonar," Humidity levels in sound suite have been in excess of 85% through much of the spring and summer seasons. Equipment has been damaged. Human subjects found working conditions intolerable during parts of the summer.

Visual sonar: Lack of programming support is causing a slippage of some milestones.

VA contract: Inadequate computer programming support.

Coast Guard contract: Lack of programming support is causing a slippage of some milestones.

d. Major facility developments, including new construction and base right agreements.

Areas of facility development included the completion of the design phase for the renovation of the animal suite (bldg 141). and the completion of the design for the rip-out of the existing anechoic chamber (Bldg 141) for the preparation of a new chamber. Construction was initiated in building 148 for a new fire exit from the basement area, which is being utilized to an ever greater extent. All three structures (Bldgs 141, 148, and 156) experienced normal maintenance during 1990. Bldg 156 required substantial air conditioning/heating maintenance; this building is scheduled for major renovation in the early 1990s.

e. Major accidents or casualties. NA

f. Storage or disposal of hazardous waste. Any hazardous waste from this Command is handled by Naval Submarine Base New London for proper processing.

g. Community relations, including disaster relief.

The hyperbaric chamber was used to treat seven carbon monoxide poisoning cases on 5 December 1989. Enclosure (28).

A third grader, Jonathan DiCarlo, and his teacher, Mrs. Dowie, from a local school, visited to observe technology which makes it possible for men to explore the bottom of the ocean, as part of a project in the school's Gifted Children Program.

h. Records set or other unique and unusual events. NA

i. List and types of aircraft. NA

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